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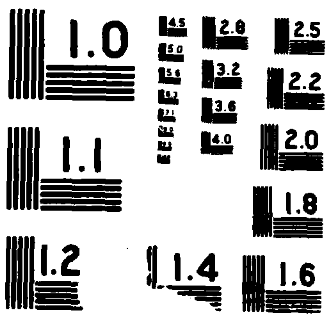
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EFFECTS OF RATING DELAY AND TRUE HALO IN LABORATORY-BASED PERFORMANCE EVALUATIONS

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RUNNING HEAD: RATING DELAY

Author Notes

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Abstract

Intervals of rating delay (immediate, one-day, two-day, seven-day) and levels of true halo (i.e., the median intercorrelations among criterion scores on the performance dimensions) were examined for effects on rater errors, rater accuracy (Cronbach, 1955), and convergent/discriminant validity. Raters were 293 undergraduates. Relationships among rating outcomes were also examined. Interactions between delay intervals and true halo (TH) were found for Differential Elevation (DEL) accuracy, and the rater errors of Observed Halo (OH) and Restriction of Range (ROR). These interactions suggested that (a) TH was positively correlated with DEL in the one-week delay condition but not in shorter intervals, (b) with increased rating delay, the correlation between TH and OH decreased, and (c) with increased rating delay, the correlation between TH and ROR decreased. Additional analyses indicated that TH was positively correlated with and predicted convergent validity. Relationships among rater error and rater accuracy scores indicated that observed leniency, OH, and ROR were not uniformly related to accuracy in predicted directions. It was concluded that the delay intervals studied had minimal independent influences on rating outcomes and that rater "error" measures could not in all cases serve as meaningful measures of rating inaccuracy. Levels of true halo in rated performances need to be considered as well.

Effects of Rating Delay and True Halo in Laboratory-based Performance Evaluations

An important aspect of performance ratings is their dependence on a rater's memory for ratee work performance (Barnes-Farrell & Couture, 1984; Bernardin & Beatty, 1984; Murphy, Balzer, Lockhart, & Eisenman, 1985; Nathan & Lord, 1983; Smither & Reilly, 1987). The importance of studying memory-based ratings is evident considering typical rating environments, where evaluative ratings can be made days, weeks, or months after observed performance (Landy & Farr, 1980). A number of rating outcomes could likely be affected when a rater depends upon his/her memory for a ratee's performance. These include rater errors such as systematic distortion (SD), leniency, restriction of range, and halo. Other outcomes such as interrater agreement/convergent validity and discriminant validity may also logically be affected by reliance on memory for performance. Moreover, when criterion scores for ratee performance are available, it becomes possible to estimate (a) rating accuracy, (b) levels of halo and leniency error (as deviations from true halo and true leniency), and (c) the relative influence of implicit covariance theories versus true levels of performance on performance ratings. In addition, when multiple sets of ratees are evaluated by multiple sets of raters, true intercorrelation among the rating dimensions (i.e., true halo) becomes a variable and its effects on rating accuracy and rater errors may be examined.

Systematic Distortion (SD) is a rater error which refers to biases in memory-based ratings such that correlations between rated dimensions occur in the direction of the implicit covariance theory (ICT) of the rater (Borman, 1983; Cooper, 1981a, 1981b). ICT is an individual characteristic which describes a rater's inferences or beliefs about how performances in specific rating categories are likely to covary among ratees. ICT has its roots in implicit personality theory research and early studies of halo and logical error (Borman, 1983; Bruner & Tagiuri, 1954; Ilgen & Favero, 1983; Newcomb, 1931; Schneider, 1973; Thorndike, 1920). While SD has been found most frequently when ratings are made under difficult memory conditions, lack of job knowledge and/or ratee familiarity (e.g., Kozlowski & Kirsch, 1987; Kozlowski, Kirsch, and Chao, 1986) have also been associated with the presence of SD. It is not clear, however, what minimum intervals of rating delay are necessary for SD to occur. In studies which have reported SD effects, rating delays have ranged from one-day (Murphy & Balzer, 1986) to several weeks (Shweder, 1975), to six months (Kozlowski & Kirsch, 1987).

An outcome thought to be the source of SD of ratings is halo (Cooper, 1981a). Although its conceptual definition as a failure to discriminate among rating dimensions is relatively consistent (Saal, Downey, and Lahey, 1980), its operational definitions are numerous. Pulakos, Schmitt, and Ostroff (1986) showed that, as measures of halo, the average standard deviation across rating dimensions is equivalent to the average interdimension correlation when ratings are first standardized within dimensions. They recommended the use

of each rater's average observed intercorrelation among the dimensions as a measure of halo. As Pulakos et al. (1986) pointed out, this measure of halo will always be perfectly correlated with halo error, with halo error defined as the difference between observed and true dimension intercorrelations. True dimension intercorrelations are computed using criterion true scores for each ratee on each of several performance dimensions. True halo is a constant when all raters view the same ratees. It is not clear, though, what general relationship may hold between observed halo and halo error when raters view different sets of ratees, and the relationships are examined across all raters. Furthermore, because halo errors may be either positive or negative, another meaningful measure of halo is the absolute value of halo error, or absolute halo error (AHE; Fisicaro, 1987). AHE provides an overall index of the amount of halo error present in ratings independent of direction of the error. Halo Error, on the other hand, provides information about both the direction (positive or negative) and the intensity of the halo error.

The rater error measures of leniency and restriction of range have also been commonly applied to performance ratings. Leniency has usually been defined as mean ratings above the scale midpoint. The central idea of leniency, according to Saal, Downey, and Lahey (1980), is that ratings are consistently too high or too low (severity). Restriction of range is commonly defined as the average of the standard deviations of ratings across ratees (Saal, Downey, and Lahey, 1980). Where leniency reflects a <u>level</u> effect, range

restriction reflects a rater's ability to discriminate among different ratees.

Additional rating outcomes relevant to performance ratings include convergent and discriminant validity. Convergent validity indicates the overall amount of agreement on ratees across raters and dimensions; and discriminant validity indicates the extent to which raters distinguish among performance dimensions (Kavanagh, MacKinney, and Wolins, 1971).

Rater accuracy measures examined in the present study were described by Cronbach (1955) and Gage and Cronbach (1955) and used frequently in performance evaluation research when criterion true scores are available. Cronbach (1955) demonstrated that a measure of the overall distance from criteria when a rater evaluates multiple ratees on multiple dimensions consists of four components: Elevation (EL), Differential Elevation (DEL), Stereotype Accuracy (SA), and Differential Accuracy (DA). In general terms, EL is a measure of the closeness of a rater's grand mean of ratings to the grand mean of criterion scores. DEL reflects how closely a rater's overall ranking of ratees corresponds to the ranking based on criterion scores. SA indicates how accurately a rater ranks the dimensions across ratees. Finally, DA indicates how accurately a rater can distinguish among ratees within each dimension. Operational definitions of all the rating outcomes used in this study are presented below in the Method section.

With the exception of Systematic Distortion, the rater error and accuracy measures described above are frequently used and their measurement is rather well standardized. The SD measure, however, has not been frequently utilized as a rater error measure per se; and its measurement varies from study to study. Consequently, additional background to the SD concept is presented below and a measurement method is described in some detail.

What is Systematic Distortion?

The systematic distortion hypothesis (SDH) predicts that traits which are semantically or conceptually similar will be recalled as if they covaried (Shweder & D'Andrade, 1979). In numerous studies, when judgmental ratings were made after varying retention intervals, the covariance structure of the memory-based ratings (average across raters) was more similar to the raters' averaged pre-existing covariance beliefs than to the actual covariance structure of the target behaviors (D'Andrade, 1974; Shweder, 1975, 1977, 1980, 1982, 1983; Shweder & D'Andrade, 1979, 1980; cf. Lamiell, 1980).

Similar results were found in studies of leadership behavior ratings (Lord, Foti, & DeVader, 1984). Subjects distorted leadership ratings to be consistent with the memory schemata manipulated by the experimenters (Phillips & Lord, 1982). In these studies, SD was explained in terms of the schematic memory of the rater (Foti, Fraser, & Lord, 1982; Nathan & Lord, 1983; Phillips & Lord, 1981).

Cooper (1981a, 1981b) and Borman (1983) presented evidence suggesting that SD occurs in performance ratings. Cooper (1981b), using Shweder and D'Andrade's (1980) method had subjects directly

rate the perceived interdimension similarities of performance dimensions. These interdimension similarity ratings were averaged across subjects and resulted in a single interdimension similarity matrix. In two studies, the similarity matrices correlated significantly with rated behavior matrices. In a third study, Cooper used videotapes and true scores developed by Borman (cited in Cooper, 1981b). Although the rated behavior matrix again correlated ($r = .55$) with the similarity matrix, it correlated even more strongly with the true score interdimension matrix ($r = .89$). This pattern did not follow the typical SD pattern in which memory-based ratings relate mor strongly with implicit theory beliefs than to criterion ratings.

One reason for Cooper's (1981b) failure to detect SD may have been that the rated behavior matrix consisted of ratings made <u>immediately</u> after viewing each videotape instead of after a significant delay. Furthermore, Kozlowski and Kirsch (1987) suggested that the use of criterion true score/videotape methods are inappropriate for studying SD because the pooled expert judgments from which criterion scores are derived may be subject to the same cognitive distortion processes as the observed ratings. This may result from inconsistency among studies in how criterion true scores are developed (Sulsky & Balzer, 1987). As discussed below, however, the procedures used by Borman et al. (1978) to develop criterion true scores are designed to minimize memory demands and job and ratee unfamiliarity on the part of the expert raters.

Borman (1983) reviewed and reanalyzed data from previous studies (Borgatta, Cottrell, & Mann, 1958; Mann, 1959; cited in Borman, 1983) and concluded that performance ratings can be distorted by semantic similarity beliefs. He offered two major criticisms, however, of SD research. First, using different raters to generate the similarity, criterion, and memory-based performance ratings produces differing frames-of-reference in interpreting the rating dimensions. This problem is reduced greatly if the same raters provide all ratings using standardized dimension definitions. The second criticism concerned methods for assessing the true intercorrelations among performance categories (i.e., true halo). For example, the Shweder and D'Andrade (1980) used behavior frequency ratings or judgmental ratings with minimal time-delay between observation and rating. As research has demonstrated, such behavior frequency and judgmental ratings are subject to the same impression-based biases as memory-based ratings (Murphy et al., 1982).

The Borman et al. (1978) method for constructing criterion true scores consisted of procedures to validate expert ratings of videotaped performances. Essentially, experts estimated means, standard deviations, and interdimension correlations of job performance on behaviorally-anchored rating scales. Based on these expert estimates, "intended" true scores were established, scripts were written, and performance videotaped for each ratee. Final true scores were then obtained from experts who studied the videotapes and assigned performance evaluation ratings. These final true scores

were validated by (a) correlating them with the intended true scores, (b) measuring interrater agreement among the experts, and (c) analysis of convergent and discriminant validity in which the ratee main effect indicated convergent validity and the ratee x dimension interaction indicatee discriminant validity. If such statistical validation is acceptable (in terms of interrater agreement, convergent and discriminant validity), one then uses the means of the expert ratings as criterion true scores (Borman et al., 1978) in the computation of accuracy scores (e.g, EL, DEL, SA and DA; Cline, 1964; Cronbach, 1955).

Measuring Systematic Distortion

The usual test for SD is based upon comparisons among a co-occurrence (or ICT) matrix, a criterion intercorrelation matrix, and an intercorrelation matrix of the rated performance categories. The typical comparison indicates a higher correlation between the co-occurrence matrix and the performance ratings matrix than between the performance ratings matrix and the criterion matrix. As depicted in Figure 1, the correlation between the co-occurrence matrix and the performance ratings matrix represents the extent to which the correlation matrix of performance category ratings covaries with implicit theories about those category interrelations.

Insert Figure 1 about here

This correlation can be denoted as a Systematic Distortion Index (SDI). Moreover, the correlation between the performance rating intercorrelations and the criterion score intercorrelations can be denoted as an index of Correlational Structure Accuracy (COSTAC). If SDI exceeds COSTAC, the result is interpreted to mean that performance ratings are more similar to implicit notions of rating category covariance than to the actual covariance in the categories. Cooper (1981b) recommended that further investigations of systematic distortion in memory-based performance ratings should elicit similarity and performance rating matrices from each rater, rather than single matrices based upon group averaged ratings. Such an individual-level approach to studying systematic distortion was applied by Kozlowski and Kirsch (1987). The present study applied both an individual and group-level analysis of SD.

Are Systematic Distortion, Halo and Accuracy Related?

Recent empirical evidence suggests a link between SD, halo and rating accuracy. Murphy and Balzer (1986) found that one-day delayed performance ratings contained higher mean interdimension correlations and higher SA and DA than immediate ratings. Cooper (1981a, 1981b), however, proposed that inflated correlational structures of memory-based ratings contain illusory halo - - a source of inaccuracy (Cooper, 1981a, 1981b; Thorndike, 1920). Murphy and Balzer (1986) explained the increased accuracy within memory-based ratings in terms of raters' reliance on accurate schematic memory via the SD process.

Kozlowski and Kirsch (1987) found that their SDI measure (i.e., conceptual similarity-rating covariation) significantly and positively correlated with observed halo (the "standardized" average variance measure); and that halo positively correlated with DA and negatively with SA. Moreover, ratee familiarity appeared to influence the direction of significant correlations of SDI with SA and DA.

In discussing the paradoxical weak positive correlations between halo and accuracy reported in a number of studies, Cooper (1981a, 1981b) suggested that some raters use their implicit covariance matrix as a heuristic which aids their accuracy (Cooper, 1981a, p. 239). While such may have been the case in the two studies reported above, others have concluded on the basis of the empirical literature that commonly used rater error measures have little or no relationship to rating accuracy (Becker & Cardy, 1986). Of course, the typical usage of rater error measures, as their name implies, presumes a negative relationship with rating accuracy.

Conclusions and Research Objectives

Rating delay intervals have been associated with the rater error of Systematic Distortion (SD). The SD effect, in turn, has been associated both theoretically and empirically with increased halo. And finally, halo has been associated with both increased and decreased accuracy in some studies. Effects of true halo have not been studied as extensively, but prior research (Smither & Reilly, 1987) suggested that increased true halo may aid some forms of rating accuracy. The primary objective of the present study was to

investigate the independent and joint effects of rating delay and true halo on several rater errors, rater accuracy, convergent and discriminant validity. A second objective was to examine correlations among the rating outcomes for comparison with previous research.

Method

Stimulus Materials and True Scores

Videotapes. Eight videotapes of classroom lectures produced and used in prior research (Murphy & Balzer, 1981, 1986; Murphy et al., 1984; Murphy et al., 1982) were used in the present study. Four drama students role-playing graduate students in psychology were videotaped with each presenting two five to seven minute lectures on the topics of Self-fulfilling Prophecies and Crowding and Stress. As with the Borman et al. (1978) tapes, predetermined varying levels of effectiveness were scripted into each lecture. The eight lectures represented varying levels of clarity and organization (good or bad), presentation style (dynamic or hesitant), and responsiveness to questions (responsive or evasive, Murphy et al., 1984).

Evaluation Rating Scale. The performance rating scale developed by Murphy and colleagues in the development of the videotapes was used in this study. This scale consisted of eight performance dimensions (e.g., Thoroughness of Preparation, Grasp of Material) which are rated on a scale from 1 (Very Bad) to 5 (Very Good). In the present study, each rating form included a photograph of the ratee along with the lecture topic as a means of identifying the ratees for the subjects/raters. Coefficient alpha for this scale in

the present study was .94, reflecting a high degree of intercorrelation among the dimensions in subjects's ratings.

Performance Category Co-Occurrence Rating Form. A Performance Category Co-Occurrence Rating Form was developed to measure raters' implicit covariance theories regarding typical classroom lecturer performance. This rating format was similar to those typically used in multidimensional scaling, implicit personality theory, and systematic distortion research (Cooper, 1981b; Schneider, 1973; Schultz & Siegel, 1964; Shweder, 1975). Each subject rated, on a scale of 0 (Not Likely to Co-Occur) to 7 (Very Likely to Co-Occur), the extent to which similar levels of performance on all 56 possible pairs of the eight dimensions are likely to be found together. Each subject's implicit covariance theory was thus defined in terms of the rated likelihood that paired performance categories covary in the general college classroom lecturer population.

Criterion scores. Murphy et al. (1984) obtained criterion scores on the performance evaluation scale rating dimensions for each of the eight videotaped performances in a manner following Borman et al. (1978). The intraclass coefficient for the ratee main effect in a rater by ratee by dimension analysis of variance was .70, and the ratee x dimension interaction intraclass coefficient was .47. As measures of convergent and discriminant validity, respectively, these values compare well with studies reporting rater x ratee x dimension analyses of performance ratings (cf. Borman, 1978; Kavanagh, MacKinney, & Wolins, 1972; Lee, Malone, & Greco, 1981). The mean expert ratings also converged with the intended true

scores as indicated by a median correlation (across tapes) of .84 (Murphy & Balzer, 1981).

Experimental Manipulation

Four experimental delay conditions were created to examine the effects of delay between observing and rating performance on the strength of systematic distortion. The four delay groups included an immediate-rating group , whose members rated the tapes immediately after viewing the four tapes; a one-day delay group, whose members returned the following day to rate the tapes; a two-day delay group, whose members returned after two days to rate the tapes; and a seven-day delay group whose members returned after seven days.

Subjects

Three-hundred and thirty-seven subjects completed the study. These consisted of 333 introductory psychology undergraduates who participated in exchange for course credit, and four volunteer graduate students in Business Administration. Fifty-two of these subjects participated under slightly different conditions than the remainder of the subjects: Instead of viewing a random sample of four of the eight videotapes, they viewed a specific set of four tapes. Because the analysis below utilizes measures of true halo, only a random sample of eight subjects from these 52 are utilized for this analysis as a means of equating the delay groups on the true halo levels contained in the stimulus videotapes. Of the 293 subjects in the present sample, the mean age was 19, ranging from 17 to 47 years of age; approximately two-thirds of the sample was female.

Procedures

Students who volunteered for this study were informed that they may be asked to return to provide memory-based ratings. Upon arrival for the initial session, subjects were given a description of the general nature of the study. Subjects participated in small groups of 1-4 and were randomly assigned as a group to one of the four delay conditions. Following an explanation of each of the performance rating dimensions, subjects completed the co-occurrence ratings.

All subjects (with the exceptions noted above) were then shown a randomly-selected sample of four of the eight videotapes, subject to the constraint that only one lecture by each actor was viewed. This procedure resulted in 14 (out of 16 possible) tape combinations viewed by raters. While viewing the tapes, raters were not permitted to take notes. After viewing the tapes, immediate-rating subjects were asked to provide performance ratings for each lecturer. Subjects assigned to the delayed rating conditions were told where and when to return to make their memory-based performance ratings. These delay condition subjects were given written instructions to return to a specified room after either a 24 hour interval, a 48 hour interval, or a one-week interval. Subjects returned to make their ratings at an hour as close as possible to the desired interval. When the delayed condition subjects returned for the second part of the experiment, they were provided with a rating packet (which included instructions and materials for the rating task), completed their memory-based ratings, and returned their

ratings to a designated location. Subjects were provided with either an oral (for immediate group) or written (for delay groups) debriefing of the experiment.

Measures

Systematic Distortion Index. Each subject's mean Performance Category Co-Occurrence Rating for each dimension pair was paired with the obtained correlation between performance ratings on each dimension pair. This resulted in a single correlation, the Systematic Distortion Index (SDI) for each subject/rater. SDI represents the degree of association between logical presuppositions about the covariance structure of the performance dimensions and a rater's obtained covariance structure of the performance dimensions.

Rating accuracy. The algebraic difference score formulas of Cronbach (1955) were used in this study. These scores can be used when $\underline{n}$ ratees are evaluated on $\underline{k}$ dimensions and criterion true scores are known for each ratee on each dimension. Because they are difference scores, higher values indicate less accuracy. Although presented in their squared form below, the square roots of each of the components were used and presented in the analyses.

Elevation (EL^2) = $(r_{..} - t_{..})^2$,

Differential Elevation (DEL^2) = $1/n \sum [r_{i.} - r_{..}) - (t_{j.} - t_{..})]^2$,

Stereotype Accuracy (SA^2) = $1/k \sum [(r_{.j} - r_{..}) - (t_{.j} - t_{..})]^2$,

Differential Accuracy =

$$1/kn \sum \sum [(r_{ij} - r_{i.} - r_{.j} + r_{..}) - (t_{ij} - t_{i.} - t_{.j} + t_{.})]^2,$$

where r_{ij} and t_{ij} = rating and true score for ratee i on dimension j; $r_{i.}$ and $t_{i.}$ = mean rating and mean true score for ratee i; $r_{.j}$ and $t_{.j}$ = mean rating and mean true score for dimension j; and $r_{..}$ and $t_{..}$ = mean rating and mean true score over all ratees and dimensions.

Rater errors. Observed Halo (OH) was computed as the median interdimension correlation of each rater's performance ratings across the four ratee videotapes viewed by each rater. Halo Error (HE) was computed for each rater by subtracting the median true score interdimension correlation for the tapes viewed by a rater from the rater's OH. Absolute Halo Error (AHE) is the absolute value of HE (Fisicaro, 1987). Observed Leniency (OL) was computed as the difference obtained by subtracting the scale midpoint (3.0) from the mean ratings within ratees, averaged across ratees. Leniency Error (LE) utilized the mean true score instead of the scale midpoint. (Absolute Leniency Error is equal to Elevation Accuracy, and was therefore not computed.) Restriction of Range (ROR) was computed as the standard deviation of ratings across ratees, averaged across dimensions. Higher values indicate greater variability in ratings across ratees and less restriction in range.

Convergent/discriminant validity. Procedures described by Kavanagh, MacKinney, and Wolins (1971) were used to obtain intraclass correlation coefficients associated with the ratee main effect (convergent validity) and ratee x dimension interaction (discriminant validity). The intraclass correlation formula estimated the reliability of an individual rater's ratings, and

included between rater variance in the error term. The intraclass indices were computed for subjects who viewed the same ratee tapes in the same rating delay condition. The sampling procedures involved in assigning ratees to raters resulted in 39 rater groups who viewed unique tape combinations in the four rating delay conditions. One tape combination was viewed by only one rater and thus was not included in the convergent/discriminant validity analyses.

Results

Performance Category Co-Occurrence Ratings

With eight performance dimensions, there are two sets of 28 pairs of performance dimension co-occurrence ratings. Each set is a symmetrical opposite of the other. The mean of each of the symmetrical opposites was taken as the implicit theory measure for each pair of performance dimensions, resulting in 28 implicit theory ratings for each subject. Table 1 presents the overall means on each of these 28 performance dimension pairings. These scores suggested that the subjects's preconceived notions about the covariance of the performance categories were rather restricted.

Insert Table 1 about here

The values ranged from 3.11 (Rapport with Audience / Responsiveness to Questions) to 6.07 (Speaking Ability / Organization and Clarity) with an overall mean of 4.89 and standard deviation of .66. Considering the eight point (0 - 7) scale used, the size of the standard deviations associated with each covariance estimate (less

than 2.0) suggested good agreement among the subjects in those estimates. The overall mean indicated that as a group, the subjects thought the "likelihood of co-occurrence" of the performance dimensions was just slightly above the midpoint of the 0 - 7 scale of co-occurrence likelihood. In addition, the mean co-occurrence ratings for each of the 28 pairs was calculated for each rating delay group in order to assess the equivalence of the implicit theories across groups. Table 2 presents the group intercorrelations of these mean ratings. The results suggested a very high degree of agreement among the groups in how they viewed the likely co-occurrence of the performance categories.

Insert Table 2 about here

Relationships among Rating Outcomes

Table 3 includes descriptive statistics for all rating outcomes (excluding convergent and discriminant validities) for the combined and separate rating delay groups.

Insert Table 3 about here

A number of observations are noteworthy in Table 3. First, the overall and within-group mean levels of True Halo are extremely high. In Pearson correlation form, the overall True Halo was approximately .95. Second, the interpretation of halo and leniency differs depending on whether true scores are considered. For

example, as can be seen in Table 3, the Observed Leniency (OL) measure indicated that raters, on average, were neither lenient nor severe in their ratings, using the scale midpoint as a criterion. But when criterion true scores were used as criteria, the majority of raters were severe in their ratings (and the percentage of raters exhibiting leniency error dropped from approximately one-half to one-quarter). In a similar manner, Observed Halo was present at high levels. According to traditional interpretation, raters failed to discriminate sufficiently among the dimensions. But Halo Error levels (Observed minus True Halo) indicated that raters discriminated too much. That is, Halo Error was consistently negative. The majority of subjects (88%) exhibited negative halo error, i.e., OH lower than true halo. Thus, one can arrive at differing conclusions regarding rating quality depending on whether or not criterion true scores are considered in rating quality indices. Third, the pattern of change in the means across the rating delay intervals is not clearly indicative of systematic change in one direction or another.

Insert Table 4 about here

The intercorrelations in Table 4 suggested that no uniform relationship existed between rater "errors" such as observed halo, leniency, or restriction of range and rater accuracy measures of EL, DEL, SA, or DA. This result raises questions about the construct validity of these variables, and the possibility of relevant

variables, not considered in the bivariate relationship, which may be important.

Table 4 also indicates the lack of relationship between the systematic distortion index (SDI) and all other measures, including all of the halo measures. SD cannot be considered as a likely correlate of observed halo in the present data. A more likely influence on halo may be true halo, which correlated significantly with Observed Halo, Halo Error, and Absolute Halo Error.

<u>Effects of Rating Delay and True Halo on Rating Outcomes</u>

Prior to testing effects of true halo, an analysis of group differences in true halo was performed. The one-way ANOVA indicated no differences among the four rating delay groups ($F(3,289) = .62$, $p > .10$). The effects of rating delay and true halo were tested in a series of eight two-way analyses of variance (ANOVA; see Table 5).

Insert Table 5 about here

Each ANOVA was considered significant only if the overall F statistics met the Bonferroni-adjusted criterion of $\alpha = (.05 / 8) = .006$. This produced an upper bound overall error rate of .048. The results indicated that rating delay and true halo had joint effects on the rating outcomes of Differential Elevation (DEL) accuracy, Observed Halo (OH), and Restriction of Range (ROR). In essence, this means that the correlations between True Halo and these outcomes change as a function of rating delay interval. Inspection of the correlations in Table 4 helps to clarify the nature of these

relationships. The correlations between True Halo and DEL change from nonsignificance to positive indicating that in the seven-day delay condition higher levels of True Halo are associated with increased DEL accuracy. This result may suggest that when a rater depends heavily on memory to rate performances, the true patterns of performance among dimensions may serve as aids. That is, when these patterns are similar (i.e., true halo is high), raters are better able to detect overall strengths and weaknesses among ratees, averaging across dimensions. In the cases of predicting ROR and OH, the effects of True Halo are present in the immediate and one-day delay intervals and absent in the longer interval conditions.

Systematic Distortion

There was no evidence from the analysis of variance in Table 5 that systematic distortion increased over the range of rating delay intervals. An additional analysis (Table 6)

Insert Table 6 about here

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examined the relative difference between the SDI and COSTAC over time. This relationship was examined at both the individual and group levels of analysis. Table 6 lists the matrix intercorrelational data (as referenced in Figure 1) in testing the SDH across each delay group in each level of analysis. For individual-level analysis, a SDI and COSTAC score was computed for each rater. The means of these scores are presented in the table at the individual-level of analysis. For the group-level analysis, a

single SDI and COSTAC score was computed for each rating delay group based on group mean co-occurrence ratings and the group means of the true score and rating intercategory correlations. Recall that systematic distortion is indicated when SDI exceeds COSTAC; and this increment in SDI should expand over time according to the SDH.

As the Table 6 data indicate, however, the increment between the mean SDI and COSTAC scores did not increase with rating delay at either level of analysis as one would expect if SD in the direction of implicit theories were occurring. None of the differences across groups were statistically significant (all $\underline{z}$'s < 1.96); and the median SDI score across all analyses (.18) was less than the median COSTAC score (.26). Figure 2 depicts the pattern of the SDI - COSTAC values across rating delay conditions for both individual- and group-level analyses. The lack of a systematic increase in SD is readily apparent.

Insert Figure 2 about here

Effects of delay and true halo on convergent and discriminant validity

Table 7 lists the results of two-way ANOVAs testing the effects of True Halo and Rating Delay on 39 indices of convergent validity and discriminant validity. Not every delay group was represented in every level of true halo, and several of the delay group-true halo cells had as few as two raters. Consequently, true halo was dichotomized at the median ($\underline{z}$ = 1.98). Likewise, the immediate and

one-day groups were combined into one group, and the two-day and seven-day groups combined. This resulted in a 2 (Low/High True Halo) x 2 (Short/Long Rating Delay Interval) ANOVA for convergent validity and discriminant validity.

Insert Table 7 about here

Intraclass indices for the ratee main effect (convergent validity/interrater agreement) and ratee x dimension interaction (discriminant validity), as described in Kavanagh et al. (1971), were converted to Fisher's z for these analyses. A strong main effect for True Halo was found for predicting convergent validity. The correlation between convergent validity and True Halo ($r(37) = .56$, $p < .001$; see Table 8) indicated that raters were better able to agree on the overall ratee performance when unique information contributed by individual dimensions was minimized (i.e., dimensions highly correlated under conditions of high true halo). Across the 39 rater groups, the average convergent validity intraclass correlation was .82 with a standard deviation of .47. The average discriminant validity index was nearly zero (-.06), with standard deviation of .13. The negative intraclass indicated that the mean square due to the ratee x dimension interaction was, on average, less than the model mean square error. The virtual absence of discriminant validity indicated that raters were not able to reliably discriminate differences in performance on dimensions within ratees on the videotapes used in this study.

Validity of Rater Error and Rater Accuracy Measures

Rating outcome measures were averaged within each of the thirty-nine unique groups of raters and correlated with the Convergent Validity and Discriminant Validity indices for the respective groups. The correlations presented in Table 8 can be interpreted as validity coefficients for the rater error and rater accuracy measures commonly used in rating research. The positive correlation between Observed Halo and Convergent Validity provides further evidence that Observed Halo cannot serve as a measure of rater error. When observed halo is corrected for true halo (Halo Error) or treated as an indicator of absolute deviation from true halo (Absolute Halo Error), however, the paradoxical relationship with convergent validity disappears. Relationships between Restriction of Range and convergent validity, and Elevation and Differential Elevation accuracy and convergent validity are in expected directions. The positive correlation betweeen Leniency Error and convergent validity may at first appear paradoxical. This relationships, however, is due to the fact that most leniency error was negative, that is, most raters rated below the true level of performance. As a result, the higher (i.e., less negative) the leniency error score, the more accurate the rater was likely to be. The proper interpretation of the Leniency Error measure, then, must consider the true levels of performance in the rated behavior.

Discussion

Effects of Rating Delay and True Halo

The conditional effects of rating delay on rater errors and rater accuracy added to mixed results from previous research which found increased accuracy over delay periods of one-day (Murphy & Balzer, 1986), decreased accuracy over periods of one week (Heneman & Wexley, 1983; using the overall D-squared measure of accuracy) and no clear effect of rating delay for a two-day delay (Nathan & Lord, 1983). A similarly mixed picture exists for the effects of rating delay on observed halo. Integretive research and reviews are needed which cumulate findings taking into careful consideration the operationalizations of rater error and rater accuracy. As argued by Becker and Cardy (1986) and Smither and Reilly (1987), true halo may enhance rating accuracy. This was the case in the present data as reflected in the interaction between Rating Delay and True Halo in predicting Differential Elevation. This result differs from Smither and Reilly (1987), who did not detect significant interactions between true halo and delay; and found instead a main effect for true halo on Differential Accuracy (and overall accuracy, D-squared). Their smaller sample ($N = 90$), however, may have lessened the ability to detect significant interactions.

The videotaped stimulus behaviors used in the present study pointed out the pitfalls of evaluating behavior characterized by high levels of true halo. The ability of raters to differentiate among the eight rating dimensions was virtually nil; but yet the inflated true halo levels may have aided interrater agreement.

Systematic Distortion. The present study tested the SDH at both individual and group levels of analyses, and found what had been interpreted as SD in previous studies: SDI greater than COSTAC in (2-day) delayed rating conditions (see Table 6). When viewed in the context of a continuum of rating delay, however, SD did not increase as expected by the SDH in neither the group nor individual-level analysis. One possibility is that this study represented a "baseline" at the lower boundary of conditions likely to elicit SD. For example, the rating delay intervals in the present study may have been insufficient to provoke and systematically increase the SD response. Kozlowski and Kirsch (1987), for example, found SD effects when performance ratings were rendered up to six months after the target performances. Also, unfortunately, no measures were taken in the present study of subjects' familiarity with ratees or the job of classroom lecturer. However, subjects in the present study, as students, were likely to be highly familiar with the job of classroom lecturer, which would have also reduced the likelihood of detecting SD. An additional consideration is that subjects in the present study had great difficulty in discriminating differences in ratee performance among the performance dimensions, as indicated by the extremely low discriminant validities and the low variance found for DA and SA compared to EL and DEL. Because SD, as operationalized here, is dependent upon covariance patterns among the performance dimensions (in measuring the SDI), the use of videotapes characterized by positively skewed true halo may inhibit the ability to detect SD by restricting the range of values in the "rated

category" and "criterion category" intercorrelation matrices (see Fig. 1). Thus, the present study may be viewed as a demonstration of the lower bound conditions for SD, with the most parsimonious interpretation of the levels and trends of SD in Figure 2 being straight lines with slope = 0 through the plots for individual and group analyses. Tests of the SD hypothesis which seek to relate intensity of SD to intervals of delay should utilize greater retention intervals, measure raters' familiarity with the ratees and with the jobs being evaluated, and consider the effects of range restriction on correlations among the covariance matrices.

Interpretability of Rater Error Measures

The correlations in Tables 4 and 8 illustrate the problems confronting the researcher, particularly in applied settings, who wishes to evaluate the quality of observed performance ratings. It was clear that, for the most part, observed halo, observed leniency, and restriction in range were not associated, in strength or expected directions, with rating accuracy or validity. The single most useful observed rater error appeared to be Restriction of Range, which correlated negatively with Elevation Accuracy, Stereotype Accuracy, and Convergent Validity. It was positively correlated, however, with Differential Elevation. Modifying the observed rater errors by their deviations from true scores did not improve interpretability of the rater error measures with the possible exception of Absolute Halo Error, which correlated negatively with Differential Elevation, Stereotype Accuracy, and Differential Accuracy.

Final Comment

This study suggested that true halo in rated performance may influence rating outcomes in conjunction with rating delay intervals; and may exert independent effects on convergent validity. As Cooper (1981a, 1981b) observed, real world performance in many jobs is likely to contain true halo. Although true halo and true levels of performance in jobs may be difficult to determine, theoretical models relating rater errors with other outcomes must confront the reality of negatively skewed true halo in certain performance evaluation environments. To be useful, performance evaluation methods, instrumentation, and rating effectiveness criteria must be interpretable when true performance variance is restricted and true performance levels are inflated and unidimensional. These conditions may occur when a workforce has been subjected to highly competitive selection and retention criteria. Implications also exist for the design of appraisal formats and feedback systems under such circumstances. The use and interpretation of commonly-used rater errors such as halo, leniency, and range restriction under these, and perhaps most circumstances, is not a simple and direct matter.

The data suggest that paradoxical as well as expected relationships can occur between rater error and rater accuracy measures and that links among rater errors and with rater accuracy need to be further explicated and reconciled with prior studies which have examined those relationships. For example, Kozlowski and Kirsch (1987), among others, found a different pattern of relations

between rater error and rating accuracy and between halo and the systematic distortion index than found in the present study. The construct validity of commonly used measures of rater error and accuracy apparently needs more systematic research.

This study demonstrated the difficulty of obtaining a clearly interpretable picture of the complex interrelationships among rating conditions and outcomes. Future research should consider using more powerful modeling techniques such as structural relations analysis (Joreskog & Sorbom, 1986) to explore prediction of rating outcomes and to identify substantive and generalizable relationships. Large sample studies which test the influence of exogenous variables such as rating delay, ratee/job familiarity, true halo, etc. on rating errors and accuracy are needed. For example, more powerful tests are needed of functional relationships between halo, systematic distortion, and accuracy. Another example is suggested by the present correlational results among true halo, rating accuracy, and observed halo. Does observed halo mediate the effects of true halo on rating accuracy? What are the implications of possible relationships between true halo and convergent validity for the design of rating instruments? The continued examination of bivariate correlations and univariate functional relationships can add little to the further understanding of these issues.

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Table 1

Means and Standard Deviations of Performance Category Co-Occurrence Ratings

		1	2	3	4	5	6	7	8
1. Thoroughness of Preparation		-							
2. Grasp of Material	M	5.78	-						
	SD	1.11							
3. Organization & Clarity	M	6.01	4.53	-					
	SD	.83	1.32						
4. Poise & Demeanor	M	5.45	5.07	4.59	-				
	SD	1.20	1.46	1.32					
5. Responsiveness to Questions	M	4.55	5.62	4.42	5.63	-			
	SD	1.37	.96	1.46	1.28				
6. Educational Value of Lecture	M	5.17	4.62	4.35	4.65	4.74	-		
	SD	1.46	1.54	1.38	1.21	1.38			
7. Rapport with Audience	M	4.86	4.26	5.11	4.49	3.11	5.14	-	
	SD	1.40	1.29	1.21	1.27	1.43	1.22		
8. Speaking Ability	M	5.66	4.46	6.07	4.53	4.10	4.03	5.45	-
	SD	1.01	1.42	.92	1.32	1.49	1.46	1.09	

Note. n = 293. Ratings were made on a scale of 0 (Not Likely to Co-Occur) to 7 (Very Likely to Co-Occur).

Table 2

Means, Standard Deviations, and Correlations for Mean Performance Category Co-Occurrence Ratings among the Delay Groups

	M	SD	1	2	3	4
1. Immediate-group	4.79	.68				
2. One-day delay group	4.99	.62	.982			
3. Two-day delay group	4.89	.71	.977	.975		
4. Seven-day delay group	4.81	.75	.963	.977	.976	

Note. n = 28. Ratings were made on a scale of 0 (Not Likely to Co-Occur) to 7 (Very Likely to Co-Occur).

Table 3
Descriptive Statistics for Rating Outcomes and True Halo for Combined and Delay Groups

		Combined	Immediate	1-day	2-day	One-week
	n	293	80	79	80	54
Elevation	M	.37	.33	.38	.36	.45
	SD	.30	.26	.27	.30	.38
Differential Elevation	M	.60	.58	.53	.66	.61
	SD	.30	.29	.24	.35	.30
Stereotype Accuracy	M	.33	.33	.34	.33	.33
	SD	.11	.12	.11	.12	.09
Differential Accuracy	M	.53	.52	.53	.54	.52
	SD	.12	.11	.13	.12	.13
Observed Leniency	M	.01	.02	.01	-.05	.10
	SD	.39	.38	.35	.44	.39
Leniency Error	M	-.28	-.22	-.30	-.24	-.38
	SD	.39	.36	.35	.40	.46
Restriction of Range	M	1.10	1.11	1.14	1.12	1.02
	SD	.29	.30	.29	.28	.30
Observed Halo	M	1.07	1.07	1.13	1.08	1.00
	SD	.57	.60	.55	.56	.30
Halo Error	M	-.76	-.82	-.64	-.79	-.81
	SD	.70	.65	.51	.79	.85
Absolute Halo Error	M	.88	.91	.70	.94	.99
	SD	.55	.51	.43	.59	.63
True Halo	M	1.83	1.89	1.76	1.86	1.81
	SD	.63	.67	.60	.66	.58
Systematic Distortion Index (SDI)	M	.13	.15	.12	.16	.08
	SD	.24	.25	.22	.23	.24

Note. Halo and SDI values are in Fisher z form. Higher accuracy score values indicate lower levels of accuracy. Higher Restriction of Range values indicate lower levels of range restriction.

Table 4

Correlations for Combined and Delay Groups

		EL[a]	DEL[a]	SA[a]	DA[a]	OH	AHE	TH	SDI
1. Elevation (El)									
2. Differential Elevation (DEL)	C	01							
	D0	-07							
	D1	04							
	D2	10							
	D7	-05							
3. Stereotype Accuracy (SA)	C	16**	-05						
	D0	26*	-16						
	D1	15	28**						
	D2	18	-13						
	D7	01	-14						
4. Differential Accuracy (DA)	C	10	06	32***					
	D0	01	14	31**					
	D1	22*	09	41***					
	D2	01	-02	21					
	D7	18	05	41**					
5. Observed Halo (OH)	C	25**	-23**	28**	45***				
	D0	17	-33**	46***	44***				
	D1	37***	-18	20*	37***				
	D2	17	-22*	26*	58***				
	D7	30*	-20	11	43***				
6. Absolute Halo Error (AHE)	C	-07	02	-19***	-35***	-48***			
	D0	-13	29**	-23*	-31**	-42***			
	D1	01	04	-20**	-40***	-41***			
	D2	02	-17	-23	-39***	-49***			
	D7	-17	13	-08	-35***	-60***			
7. True Halo (TH)	C	15**	00	05	03	33***	44***		
	D0	13	01	18	12	49***	48***		
	D1	28**	-02	03	03	60***	38***		
	D2	21	-16	00	06	18	39**		
	D7	-05	39**	-07	-16	-10	52***		
8. Systematic Distortion Index (SDI)	C	00	03	-03	-13*	-05	-04	-09	
	D0	-10	07	-09	-29**	-16	09	-04	
	D1	-02	09	08	05	02	-14	-03	
	D2	-07	09	-12	-21	-06	01	-14	
	D7	13	-16	06	-05	02	-19	-21	

(Table continues)

Table 4 (Continued)

Correlations for Combined and Delay Groups

		EL[a]	DEL[a]	SA[a]	DA[a]	OH	AHE	TH	SDI	ROR	OL	LE
9. Restriction of Range[b] (ROR)	C	-25***	22***	-08	11	-66***	27***	-30***	-04			
	D0	-28**	35**	-29**	-03	-67***	33**	-39***	-11			
	D1	-16	22*	06	13	-74***	19	-55***	04			
	D2	-35**	15	-16	06	-59***	19	-17	08			
	D7	-16	24	-19	23	-62***	35**	-01	-16			
10. Observed Leniency (OL)	C	63***	06	07	06	04	-02	-01	05	-07		
	D0	65***	-14	16	-02	02	-15	-05	06	-18		
	D1	61***	11	11	15	01	-05	-10	19	08		
	D2	67***	15	-04	-06	03	14	15	02	-20		
	D7	73***	09	09	21	16	-09	-10	-01	-00		
11. Leniency Error (LE)	C	80***	06	13	06	20***	-05	17**	03	-22***	75***	
	D0	77***	-15	31**	-09	15	-07	15	-11	-27**	79***	
	D1	84***	20	14	21	34**	01	30**	08	-19	74***	
	D2	72***	15	02	-07	09	-01	18	-01	-31**	78***	
	D7	88***	07	04	21	22	-14	-02	12	-03	83***	
12. Halo Error (HE)	C	07	-19***	18**	34***	52***	-78***	-63***	04	-27***	04	01
	D0	02	-31**	24*	29**	43***	-89***	-58***	-10	-23*	07	-02
	D1	07	-18	18	36***	38***	-88***	-51***	06	-16	12	02
	D2	-06	-03	18	36***	56***	-68***	-71***	08	-29**	-10	-08
	D7	24	-40**	13	40**	74***	-76***	-74***	15	-41**	18	16

Note. Decimals omitted. C = Combined sample, n = 293. D0 = Immediate rating group, n = 80. D1 = One-day delay group, n = 79. D2 = Two-day delay group, n = 80. D7 = Seven-day delay group, n = 54. Halo and SDI values are based on Fisher z transformations.

[a]signs have been reversed to reflect correlations with accuracy.

[b]signs have been reversed to reflect correlations with restricted range, i.e. decreased averaged standard deviations.

* p _ .05

** p _ .01

*** p _ .001

Table 5

Two-Way Analyses of Variance: Effects of Rating Delay and True Halo on Rating Outcomes

Dependent Variables	Source	df	ms	F	F^a	R^2
Elevation	Delay	3	.07	.76	2.32	.05
	True Halo	1	.38	4.41		
	True Halo x Delay	3	.10	1.18		
	Error	285	.09			
Differential Elevation	Delay	3	.28	3.30*	2.91**	.07
	True Halo	1	.10	1.13		
	True Halo x Delay	3	.32	3.84*		
	Error	285	.08			
Stereotype Accuracy	Delay	3	.01	.61	.47	.01
	True Halo	1	.00	.34		
	True Halo x Delay	3	.01	.77		
	Error	285	.01			
Differential Accuracy	Delay	3	.01	.89	.50	.01
	True Halo	1	.00	.01		
	True Halo x Delay	3	.01	.82		
	Error	285	.02			
Observed Halo	Delay	3	1.54	5.59**	8.77***	.18
	True Halo	1	7.32	26.52***		
	True Halo x Delay	3	2.03	7.36***		
	Error	285	.28			

Table 5 (continued)

Two-Way Analyses of Variance: Effects of Rating Delay and True Halo on Rating Outcomes

Dependent Variables	Source	df	ms	F	F^a	R^2
Observed Leniency	Delay	3	.28	1.84	1.13	.03
	True Halo	1	.02	.16		
	True Halo x Delay	3	.18	1.17		
	Error	285	.15			
Range Restriction	Delay	3	.21	2.74*	7.13***	.15
	True Halo	1	1.79	23.81***		
	True Halo x Delay	3	.33	4.35**		
	Error	285	.08			
Systematic Distortion Index	Delay	3	.02	.36	1.20	.03
	True Halo	1	.17	3.16		
	True Halo x Delay	3	.03	.48		
	Error	285	.06			

[a]for overall model with 7 and 285 degrees of freedom.

* $p < .05$ ** $p < .01$ *** $p < .0001$

Table 6

Systematic Distortion among the Delay Groups: Individual and Group-level Analyses

Level of Analysis	n	Delay Group	SDI[a]	COSTAC[b]
Individual[c]	80	Immediate	.15	.13
Individual[c]	79	One-day delay	.12	.15
Individual[c]	80	Two-day delay	.16	.08
Individual[c]	54	Seven-day delay	.08	.10
Group	28	Immediate	.65	.41
Group	28	One-day delay	.29	.41
Group	28	Two-day delay	.59	.37
Group	28	Seven-day delay	.25	.42

Note. All correlation values are in Fisher *z* form. None of the correlational differences across groups (within levels of analysis) are significantly different.

[a]SDI = systematic distortion index.

[b]COSTAC = correlational structure accuracy.

[c]SDI and COSTAC values for individual level analysis represent means.

Table 7

Effects of Rating Delay and True Halo on Convergent and Discriminant Validity Indices

Dependent Variable: Convergent Validity Index

Source	df	ms	F	Model R^2	Model F
True Halo	1	3.15	21.29***	.39	7.43***
Delay Interval	1	.02	.13		
True Halo x Delay Interval	1	.02	.12		
Error	35	.148			

Dependent Variable: Discriminant Validity Index

Source	df	ms	F	Model R^2	Model F
True Halo	1	.004	.22	.02	.22
Delay Interval	1	.003	.13		
True Halo x Delay Interval	1	.007	.37		
Error	35	.019			

***$p < .0001$

Table 8

Group-Level Correlations

	True Halo	Covergent Validity	Discriminant Validity
True Halo	-	-	-
Convergent Validity	.56***	-	-
Discriminant Validity	-.04	.20	-
Observed Halo	.62****	.66****	.12
Halo Error	-.86****	-.28	.13
Absolute Halo Error	.68****	.16	-.08
Restriction of Range (ROR)	-.56***	-.57****	.18
Observed Leniency	-.01	-.05	.04
Leniency Error	.34*	.52***	.29
Elevation (EL)	.31	.51***	.25
Differential Elevation (DEL)	.05	.51***	.36*
Stereotype Accuracy (SA)	.27	.21	.46**
Differential Accuracy (DA)	.04	.09	.23

Note. n = 39. Signs of correlations with ROR and El, DEL, SA and DA were reversed to reflect range restriction and accuracy.

* $p < .05$ **$p < .01$ ***$p < .001$ ****$p < .0001$

Figure Caption

Figure 1. Correlational matrices in the analysis of systematic distortion effects.

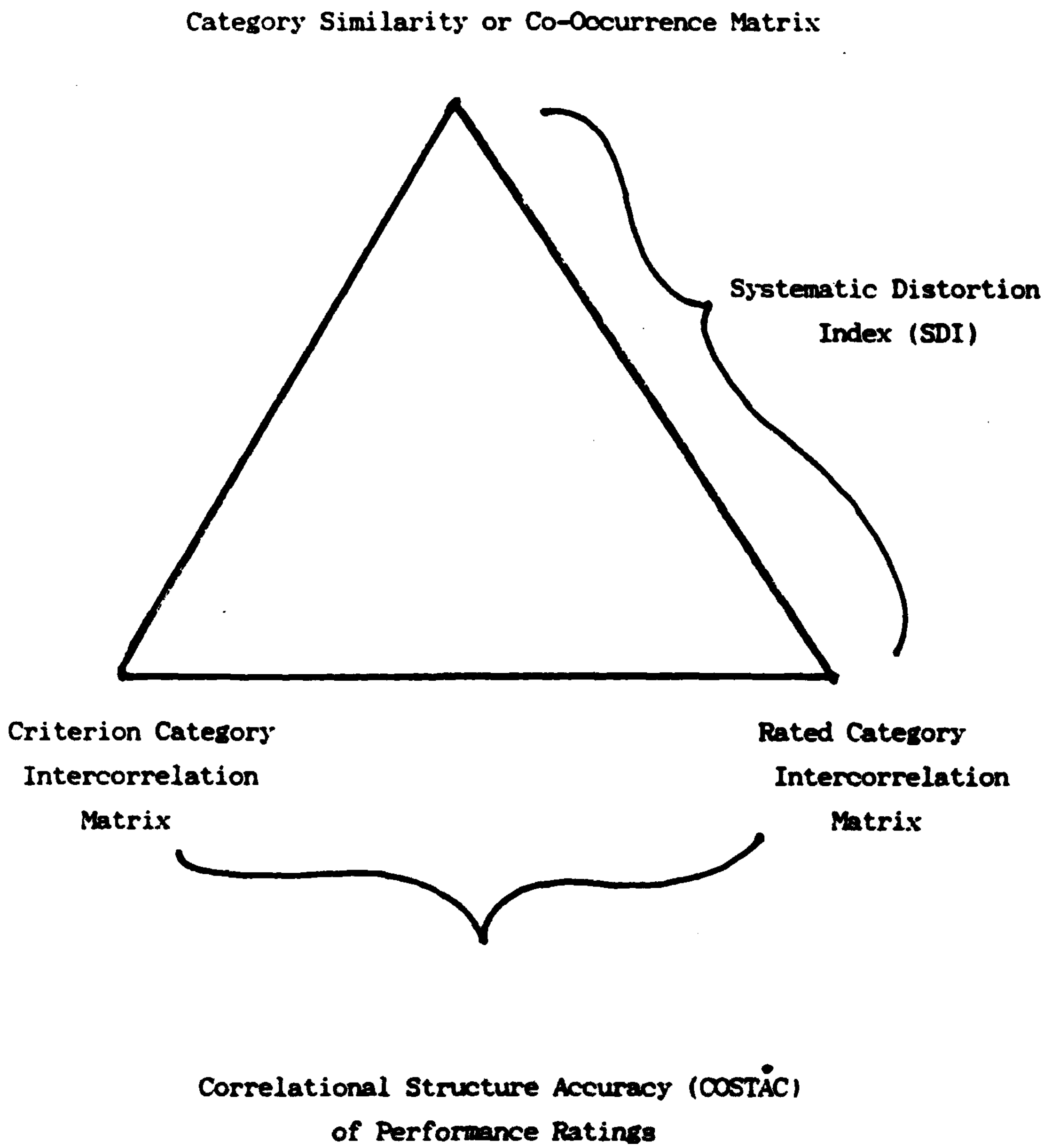
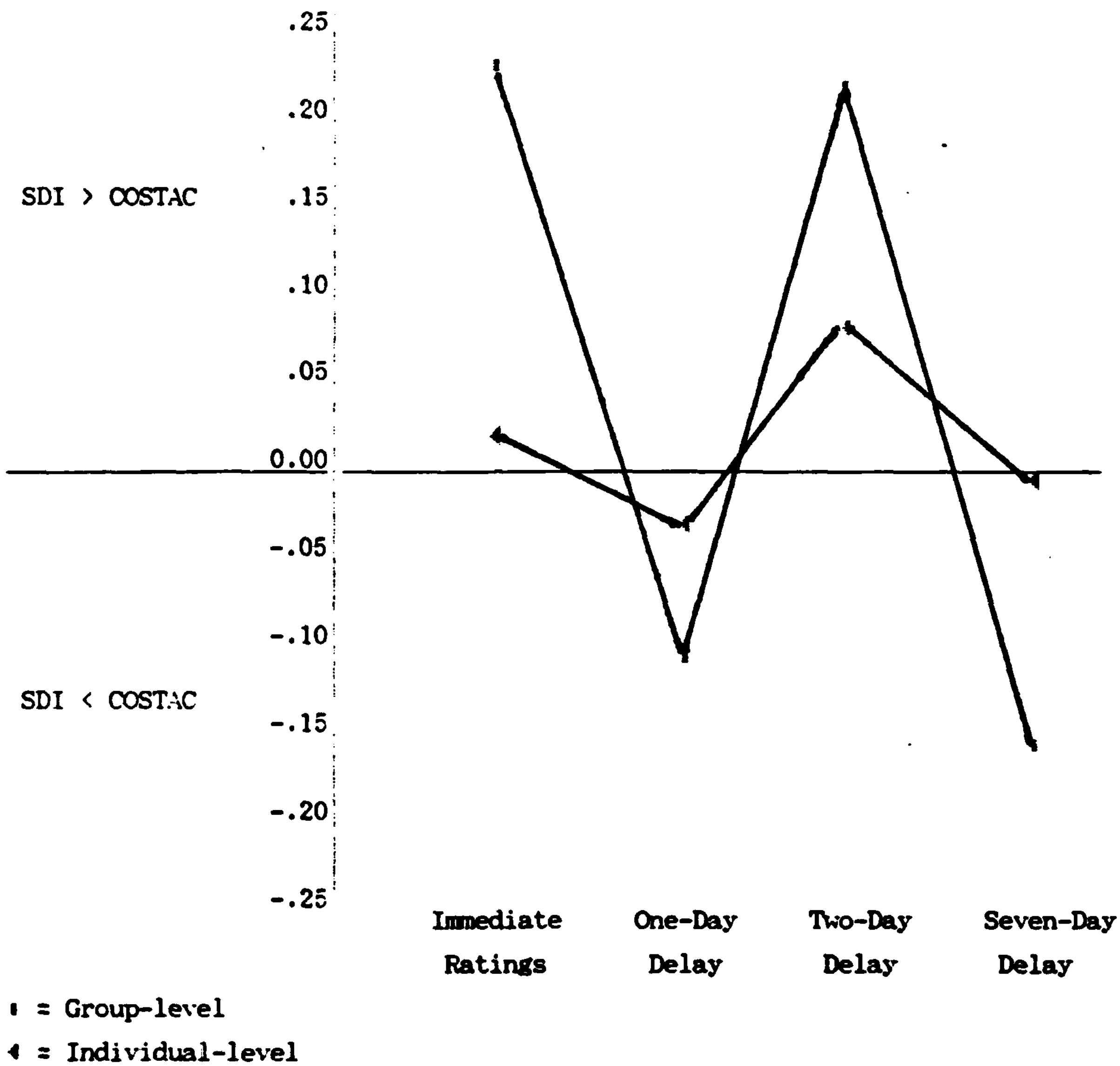

Category Similarity or Co-Occurrence Matrix
Systematic Distortion Index (SDI)
Criterion Category Intercorrelation Matrix
Rated Category Intercorrelation Matrix
Correlational Structure Accuracy (COSTAC) of Performance Ratings

Figure Caption

Figure 2. Systematic Distortion Trends for Individual and Group-Level Analyses.


.25
.20
SDI > COSTAC
.15
.10
.05
0.00
-.05
-.10
SDI < COSTAC
-.15
-.20
-.25
Immediate Ratings
One-Day Delay
Two-Day Delay
Seven-Day Delay
= Group-level
= Individual-level

END
DATED
FILM
8-88
DTIC